

Class Diagrams Explained Like a Professor

1 What is a Class Diagram?

A class diagram is a **structural UML diagram** that serves as the blueprint of a system. It describes:

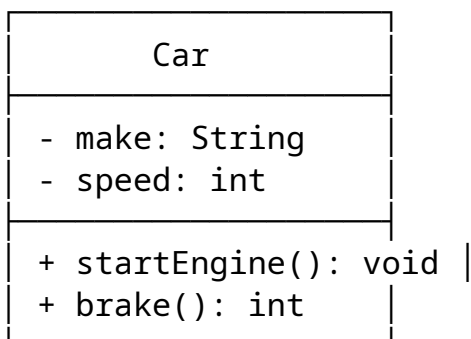
- **Classes:** Templates for objects.
- **Attributes:** Data or properties of a class.
- **Methods:** Functions or behaviors of a class.
- **Relationships:** Connections between classes, such as inheritance or associations.

2 Anatomy of a Class

A class is represented with three compartments:

1. **Name:** The name of the class (e.g., Car).
2. **Attributes:** Data fields (e.g., make: String, speed: int).
3. **Methods:** Operations (e.g., startEngine(): void, brake(): int).

Example:



3 Key Relationships

Classes interact through various relationships, summarized in the following table:

Relationship	Description	Symbol	Real-World Example
Inheritance	"Is-a" hierarchy.	Hollow arrow	ElectricCar → Car
Association	General link (e.g., uses/knows).	Solid line	Driver – Car (drives)
Aggregation	"Has-a" (independent parts).	Hollow diamond	School ◊– Student
Composition	"Has-a" (dependent parts).	Filled diamond	House – Room
Dependency	Temporary use (e.g., method parameter).	Dashed arrow	TripPlanner --> Route (calculates)

4 Real-World Example: Library System

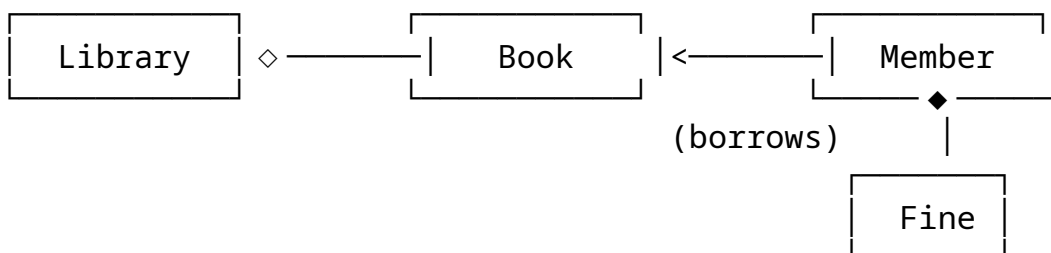
Classes:

- **Book:** Attributes (ISBN, title), Method (borrow()).
- **Library:** Attributes (name, listOfBooks).
- **Member:** Attributes (memberID), Method (borrowBook()).
- **Fine:** Attributes (amount), Method (calculateFine()).

Relationships:

- **Aggregation:** Library ◊– Book (books can exist without the library).
- **Association:** Member – Book (borrows).
- **Composition:** Fine – Member (a fine cannot exist without a member).

Diagram:



5 Exercise: Social Media App

Design a class diagram for a social media platform with:

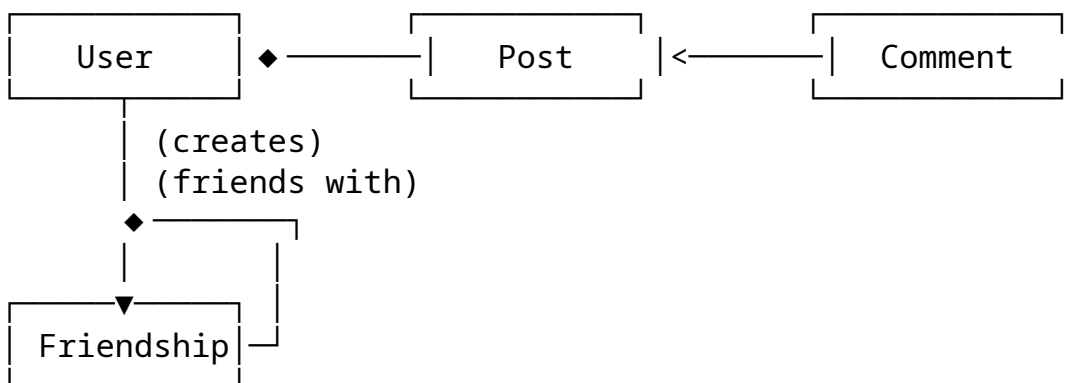
- **Users** who create **Posts** and **Comments**.
- **Posts** that can have multiple **Comments**.
- **Friendships** between users.

Tasks:

1. Identify classes, attributes, and methods.
2. Define relationships (e.g., inheritance, aggregation).
3. Add multiplicities (e.g., 1 User → * Posts).

6 Sample Solution

Diagram:



Explanation:

- User has a **composition** () relationship with Post (posts cannot exist without a user).
- Post has an **association** with Comment.
- Friendship is a separate class linking two users.

7 Conclusion

Class diagrams are essential for modeling system structures. Practice by sketching the social media app diagram and comparing it with the sample solution provided.